

AMENDMENTS TO THE CLAIMS

1-36. (Canceled)

37. (Currently Amended) An impurity doping method for semiconductor having a crystal layer ~~wherein a crystal layer made of crystal raw materials is doped with impurities,~~
the method comprising:

~~a supply of different doping types of impurity raw materials at close timings in a pulsed manner within one cycle wherein all types of said crystal raw materials are supplied in one time each in the case when plural types of said crystal raw materials are alternately supplied in a pulsed manner with maintaining each of predetermined purge times;~~

~~wherein an acceptor level of said semiconductor having a deep band gap becomes shallow, since the complex probability of three atoms increases by applying the tendency that the atoms easily move around on a surface of said crystal and a molecular state acceptor which is obtained by associated two acceptors and a donor is produced~~

supplying a first crystal raw material to form a first layer;

after the step of supplying a first crystal raw material stops, supplying a second crystal raw material different from the first crystal raw material to form a second layer on the first layer;

supplying at least one p-type impurity raw material and at least one n-type impurity raw material before the step of supplying the second crystal raw material, thereby doping an impurity pair of the at least one p-type impurity raw material and the at least one n-type impurity raw material into only the first layer.

38. (Currently Amended) The impurity doping method for semiconductor according to claim 37, wherein the step of supplying the at least one p-type impurity raw material and the at least one n-type impurity raw material includes:

supplying one of the at least one p-type impurity raw material and the at least one n-type impurity raw material; and

after the step of supplying one of the at least one p-type impurity raw material and the at least one n-type impurity raw material, supplying the other one of the at least one p-type impurity raw material and the at least one n-type impurity raw material

~~said different doping types of impurity raw materials being supplied at close timings in a pulsed manner either at the same time of, or after starting a supply of predetermined types of crystal raw materials as well as before starting a supply of the other predetermined types of crystal raw materials within said one cycle.~~

39. (Currently Amended) The impurity doping method for semiconductor according to ~~claim 38~~ claim 37, wherein the step of supplying the at least one p-type impurity raw material and the at least one n-type impurity raw material includes:

supplying the at least one p-type impurity raw material and the at least one n-type impurity raw material simultaneously

~~said different doping types of impurity raw materials comprises a first impurity raw material of a first doping type and a second impurity material of a second doping type being different to the first doping type, which are supplied at close timings in a pulsed manner~~

~~either at the same time of, or after starting a supply of a first crystal raw material as well as before starting a supply of a second crystal raw material within one cycle wherein said first and second crystal raw materials are supplied in one time each in the case when said first crystal raw material is supplied alternately with said second crystal raw material in a pulsed manner with maintaining each of predetermined purge times.~~

40. (Currently Amended) The impurity doping method for semiconductor according to ~~claim 39~~claim 37, wherein the step of supplying the at least one p-type impurity raw material and the at least one n-type impurity raw material includes:

supplying the at least one p-type impurity raw material and the at least one n-type impurity raw material after starting supplying a first crystal raw material

~~a supply of said first impurity raw material is started in synchronous with starting a supply of said first crystal raw material, a supply of said second impurity raw material is started after finishing the supply of said first impurity raw material, and~~

~~the supply of said second impurity raw material is finished before starting the supply of said second crystal raw material.~~

41. (Currently Amended) The impurity doping method for semiconductor according to ~~claim 39~~claim 37, wherein: ~~there is a period of time wherein said first impurity raw material is supplied with said second impurity raw material at the same time~~ the step of supplying the at least one p-type impurity raw material and the at least one n-type impurity raw material includes:

supplying the at least one p-type impurity raw material and the at least one n-type impurity raw material simultaneously at least for a predetermined period of time.

42. (Currently Amended) The impurity doping method for semiconductor according to one of claims 37 to 41 and 43, wherein:

~~a the first~~ crystal raw material ~~supplied precedently within said one cycle in said crystal raw materials~~ is at least one member selected from the group consisting of Ga, Al, In, B, Zn, and Cd, ~~while and the second~~ crystal raw material ~~supplied latterly within said one cycle~~ is at least one member selected from the group consisting of N, As, P, S, Se, and Te.

43. (Currently Amended) The impurity doping method for semiconductor according to ~~claim 42~~claim 37, wherein: the step of supplying the at least one p-type impurity raw material and the at least one n-type impurity raw material includes:

supplying the at least one p-type impurity raw material and the at least one n-type impurity raw material at the same time of starting supplying a first crystal raw material

~~said different doping types of impurity raw materials are a p-type impurity raw material and an n-type impurity raw material.~~

44. (Currently Amended) The impurity doping method for semiconductor according to ~~claim 43~~claim 37, wherein the first crystal raw material is TMGa, the second crystal raw material is NH₃, the at least one p-type impurity raw material is (Cp)₂Mg, and

the at least one n-type impurity raw material is TESI, and wherein a combination of the steps in claim 37 includes:

~~said different doping types of impurity raw materials are comprised of (Cp)2Mg being a first impurity raw material and TESI being a second impurity raw material,~~

~~said plural types of crystal raw materials are comprised of TMGa being a first crystal raw material and NH3 being a second crystal raw material;~~

~~said cycle comprises the steps of:~~

- (a) supplying TMGa and (Cp)2Mg at a first timing,
- (b) finishing the supply of TMGa and (Cp)2Mg at a second timing at which the supply of TMGa and (Cp)2Mg for a predetermined period of time was completed;
- (c) supplying TESI either immediately after, or after the second timing at with the supply of TMGa and (Cp)2Mg was finished.
- (d) finishing the supply of TESI at a third timing at which the supply of TESI for a predetermined period of time was completed;
- (e) supplying NH3 either immediately after, or after the third timing at which the supply of TESI is finished,
- (f) finishing the supply of NH3 at a fourth timing at which the supply of NH3 for a predetermined period of time was completed;
- (g) starting a predetermined purge time after the supply of NH3 at the fourth timing at which the supply of NH3 was completed,
- (h) finishing said predetermined purge time at a fifth timing; and
- ~~said cycle being repeated~~(i) repeating the steps of (a)-(h) a desired number of times.

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45-48. (Canceled)